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**MULTI-STAGE OPTICAL AMPLIFIER
AND BROADBAND COMMUNICATION SYSTEM**

5 **Cross-Reference to Related Applications:**

This application is a continuation-in-part of U.S. Patent Application Serial No. 09/471,753, filed December 23, 1999, and a continuation-in-part of U.S. Patent Application Serial No. 09/471,747, 10 filed December 23, 1999, and a continuation-in-part of U.S. Patent Application Serial No. 09/719,591, filed December 12, 2000, all of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

15 This invention relates generally to multi-stage optical amplifiers, and more particularly to broadband communication systems that include one or more multi-stage optical amplifiers.

Description of the Related Art

20 The demand for bandwidth continues to grow exponentially on fiber-optic superhighways due to applications such as data communications and the internet. Consequently, there is much effort at exploiting the bandwidth of optical fibers by using higher speeds per channel. Examples include time-division multiplexed systems-and wavelength-division multiplexing (WDM).

25 Most fiber-optic networks currently deployed use standard single-mode fiber or dispersion-shifted fiber (DSF). Standard fiber has a zero dispersion wavelength around 1310 nm, and the dispersion is primarily